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EDITORIALS.

THE December *Forum* contains an interesting article by Dr. D. G. Brinton on "The Beginning of Man and the Age of the Race." It affords, incidentally, several suggestions of value to geologists who are concerned in working out the problems which relate to the fossil relics of man on this continent. Dr. Brinton reasons that we have good grounds for locating man's birthplace only where mammals that are very near to him in physical prowess and mental aptitude are known to have existed some fifty or one hundred thousand years ago. This, he thinks, "at once excludes a large portion of the earth's surface, as the Arctic, Antarctic, and colder temperate zones, the lofty plateaus of the world and its inclement shores." "The whole of America must be excluded, for it shows no signs of having been the home of the higher mammals, that is, apes or monkeys without tails and with thirty-two teeth." By similar exclusions, the area of probable origin of man is limited to Southern Asia, Southern Europe, and Northern Africa. A fuller exposition of Dr. Brinton's views was given in his address before the American Association for the Advancement of Science at Madison last August.

Without giving unqualified assent to all the limitations urged by Dr. Brinton, it would appear from the distribution of types kindred to man in the Pliocene and Pleistocene periods, and from the fact that the evolution of a naked animal from the hairy one can reasonably be supposed to have taken place only in a very warm climate, that primitive man, in the strict and proper sense of the term, can scarcely be supposed to have been an inhabitant of America. It is difficult to see how he could have reached this continent while in his strictly primitive state by land migration (even if there were land connection in the Behring region)

without traversing extensive cold and mountainous tracts quite prohibitory to a strictly primitive naked man of tropical origin, unless such transit were made in the early part of the Tertiary era before the development of cold northern climates and before the erection of the modern mountain systems. The early Tertiary, however, was an era of submergence rather than of elevation and land connection, and the possibility of such migration is extremely doubtful. Primitive man cannot well be supposed to have gained access to America by water until he had learned the art of navigation, or, in other words, until he had reached a somewhat advanced state of civilization. The strong presumption is, therefore, that man came to America only after he had attained to a stage of development much beyond the primitive one. It would appear that he must have become possessed of the power of protecting himself from the vicissitudes of climate and of securing the means of living under adverse conditions, or else had acquired the arts of navigation to an extent that would permit him to cross from the one continent to the other in warm latitudes.

As man's full evolution did not, therefore, probably take place on this continent, a complete series of relics of that evolution cannot be looked for here. Hence a system of interpretation of fossil relics which is based upon a theory of complete evolution here or which presumes the existence here of a complete series of relics does not carry inherent force, but rather the contrary. It is more probable that the oldest fossil relics of man on this continent represent, not a primitive, but some advanced stage of evolution. There is no inherent reason for expecting to find "paleolithic" or any other very primitive stage of culture here, however well demonstrated that stage may be on the eastern continent. To establish the existence of that stage here, unquestionable geological evidence, strong in itself and quite independent of theoretical support, must be produced. The geological problem in America will be greatly clarified when it is recognized that its solution must rest on strict stratigraphical and palæontological grounds, and not on any parallelism with a

theoretical evolution applicable only to the land of man's origin. The present stage of civilization is certainly not an immediate derivative of the next preceding, but has been imposed upon it unconformably, so to speak, and disjunctively. It is intrusive or superposed, and not derivative. So it is probable that the peculiar phases of the higher civilizations found in Central and South America were intrusive and not derivative. It is, therefore, not improbable that the entire succession of civilizations on the American continent consists of a series of intrusions or superpositions from the west and from the east, overlapping each other unconformably and disjunctively. They can, therefore, be worked out safely upon no theory of genetic succession. Each factor must be determined by means of its own inherent evidence.

T. C. C.

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PROFESSOR JAMES D. DANA has a short article in the November number of the *American Journal of Science*¹ touching upon the recent discussion of the divisibility of the glacial period, in which he draws forth generalizations on two important lines, viz., (1) the personal attitude of writers on the subject, and (2) the difference between the glacial phenomena of New England and of the upper Mississippi basin. These seem to us to lie in the right direction, in the main, but in both cases to have somewhat missed the truest lines of distinction and to have fallen short of the most significant features. Professor Dana draws attention to the divergent views of New England and of western glacialists, and concludes that there must be some difference in the phenomena of the two regions to account for the differences of view. This seems to us very true and very important. The difference in the phenomena is, however, we think much more radical, and, at the same time, much more simple than that suggested by Professor Dana. It is, to our view, simply this: In New England only the latest epoch of the glacial period is distinctly repre-

¹ New England and the Upper Mississippi Basin in the Glacial Period. *Am. Jour. Sci.* III., Vol. XLVI., No. 275, Nov., 1893, pp. 327-330.

sented. The earlier episodes (to use a term not in controversy) may have representatives there in overridden and buried deposits, but, if so, they are obscure and have not been distinctly delineated. In the West, on the other hand, a very considerable series of episodes is well displayed. These embrace not only those presented in New England, but a considerable series of earlier ones not at all (distinctly) represented there. These greatly prolong and diversify the glacial series. In our judgment, it is not simply a doubling of that of New England, but a much higher multiplication. The whole series cannot, therefore, be judged by the incomplete New England representatives. All investigators, we think, or nearly all, agree that the New England glacial deposits fall within a relatively brief epoch and are not much (at least not very distinctly) differentiated. We agree heartily with those who would refer the declared New England drift to one epoch (reserving opinion, of course, regarding remnants of overridden or obscure drift of earlier episodes). New England is little better fitted to be a standard for the interpretation of the whole glacial series than it is for the whole Palæozoic series. In neither case is the series fully and distinctly represented, nor in either case is it typical. This is implied significantly in the relative state of delineation of the formations in the eastern and western sections. With a great preponderance of workers and of skill, no historical divisions of the glacial formations have yet been traced entirely across New England, not even those of an episodal rank. In the interior, on the other hand, something like a score of historical stages have been delineated over broad areas. Lines of episodal delimitation aggregating many thousands of miles have been mapped. Any attempt, therefore, to revise the work of the interior by the phenomena of New England is not likely to be more successful than the revision of the Palæozoic series on a like basis.

In classifying personal opinions, a dividing line separating the New England and the western workers is valuable and significant. But a much more significant cleavage plane, we think, may be found between those glacialists who have studied the

later episodes (or the earlier episodes) exclusively and those who have studied *both*. To have studied the Hudson River beds, east and west, is an inadequate preparation for deciding whether they are to be placed in a separate epoch from the Trenton beds or not. Both the Hudson River beds and the Trenton beds should be studied in regions where both are well displayed. So of the drift deposits. Classified on the basis of the *formational* distribution of critical studies, the true generalization falls easily into form, viz., those who have studied the formations of one epoch believe in one epoch; those who have studied the formations of more than one epoch, believe in more than one epoch.

The special individual opinion upon which Professor Dana lays stress ceases to have significance, or rather has its significance reversed, when it is observed that the studies on which it is based (most admirable in extent and in quality) fall almost exclusively within zones referred, by common consent, to a single, late, relatively brief glacial epoch.

Respecting the reference of the differences between the drift of the east and of the west to meteorological causes there is room here only for inviting attention to the pregnant fact that the greatest southward extension of the drift is found where the present meteorological and topographical conditions are least favorable. The drift of the interior reaches south of 38° latitude, that of New England only a little south of 41° , a difference that equals about three-fourths of the extent of New England in latitude, exclusive of Maine. The inferiority of the drift of New England in extent, in massiveness, and in serial development is the feature that calls for explanation in adverse conditions rather than the magnificent deployment of the glacial series on the plains of the interior.

T. C. C.